प्रभावी विनियमन – सुगम संचार
Effective Regulation – Ease of Communication

Operator Assisted Drive Test Report

Udaipur
March. 2022

(RO, Jaipur)

Key Performance Indicators: All TSPs have met the Drop Call Rate (DCR) benchmark of 2%. All TSPs have met the Call Setup Success Rate (CSSR) of 95%.

TRAI Regional Office, Jaipur as directed by TRAI HQ has got conducted the operator assisted drive test with the help of Telecom Service Providers of Rajasthan LSA in Udaipur City and surrounding areas Nathdwara SDCA of Udaipur SSA during 22 March to 25 March 2022. The drive test covered drive route of approx. 250 KMs & 6 hotspots over a period of 4 days. Approximately 250 calls were made for each of the networks: 2G/3G networks, LTE networks covering four TSPs. The drive test reports were generated through TSPs tools and was compiled by the TRAI RO Jaipur.

Overview

Voice Summary

Data Summary

Overview

Regional Office, TRAI Jaipur got conducted Operator Assisted Drive Test from 22nd March to 25th March 2022 covering various locations in Udaipur City & surrounding areas Nathdwara SDCA of Udaipur SSA. The performance of Airtel, BSNL, Vodafone Idea and Jio were monitored across various technologies (2G, 3G and 4G) by TSP's themselves through their own test kits. The TSP's reports obtained from these drive tests were complied to assess the network quality for Voice and Data services in terms of following

Voice: Coverage, Quality, Handover Success Rate, Call Setup Success Rate, Drop Call Rate and Block Call Rate.

Data: Download and Upload Throughputs, Web Browsing Delay and Latency

Drive Test Details :

Voice Tests: Calls were made for 90 sec duration with wait time of 10 sec between calls in all technologies. The drive test covered a drive route of approximately 250 + KMs over a period of 4 days from 22nd March to 25th March 2022. Approximately 280 + calls were made for each of the 7 networks: three 2G (Lock Mode) networks, one 3G (Dual mode) networks and three VoLTE network covering 4 unique TSPs.

Data Tests:

1.Dynamic data test was conducted for download throughput for 3G & 4G technologies.

2. Data Tests were performed at 6 static locations for 2G, 3G & 4G technologies.

* For Voice and Data KPI's, 2G measurement is done with UE locked mode, 3G measurement is done with UE in Dual mode (2G & 3G) and 4G measurement is done with UE in Free Mode.
* 3G KPI's which are calculated from UE in Dual Mode (2G & 3G) includes samples and events of 2G.
* 4G KPI's which are calculated from the UE in Free Mode included samples and events of 2G & 3G.

Service	Specifications
Download	2G (Locked) - 500KB, 3G (Dual) - 20 MB, 4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Dual) - 5 MB, 4G (Free) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in, www.flipkart.com and PayTm
Latency	32 Bytes on www.google.com

Voice & Dynamic Data Test Drive Route

Drive route day 1 _ 22nd March

Starting point Surajpole,Delhigate,court choraya,shakiti nagar,Ashok nagar, sobhapura,bhupalpura,New bhupalpura, Panchwati, bhuana, celebration mall ,sukher circle,Amberi flyover,Raghunathpura,Ayad rural,Ahada,durga nursing road,sewa shram,thokar choraha,pratapnagar to amberi Flyover

Drive route Day 2_23rd March

Starting point Delhi gate,Madhuban,Ambamata chok,Gourela,ranii road,dewali,fetehpura,bharti lok kala mandal to delhi gate to udiyapole bus stand,railway stand,paras,goverdhan vikas,balicha, sec 9. ,titardi choraha,parshuram choraya,gariyawas,hiran magri sec,3,4,5,6,eklingpura to pratap nagar

Drive route day 3_ 24th March

Starting point Udaipur (Amberi flyover) to Nathdwara bus stand & static data test at Nathdwara Bus-stand on day 3

Static Location for Data test _25th March

Udaipur Bus stand , Udaipur Railway station , Udaipur Gov. Hospital , Udaipur Airport, Udaipur lake
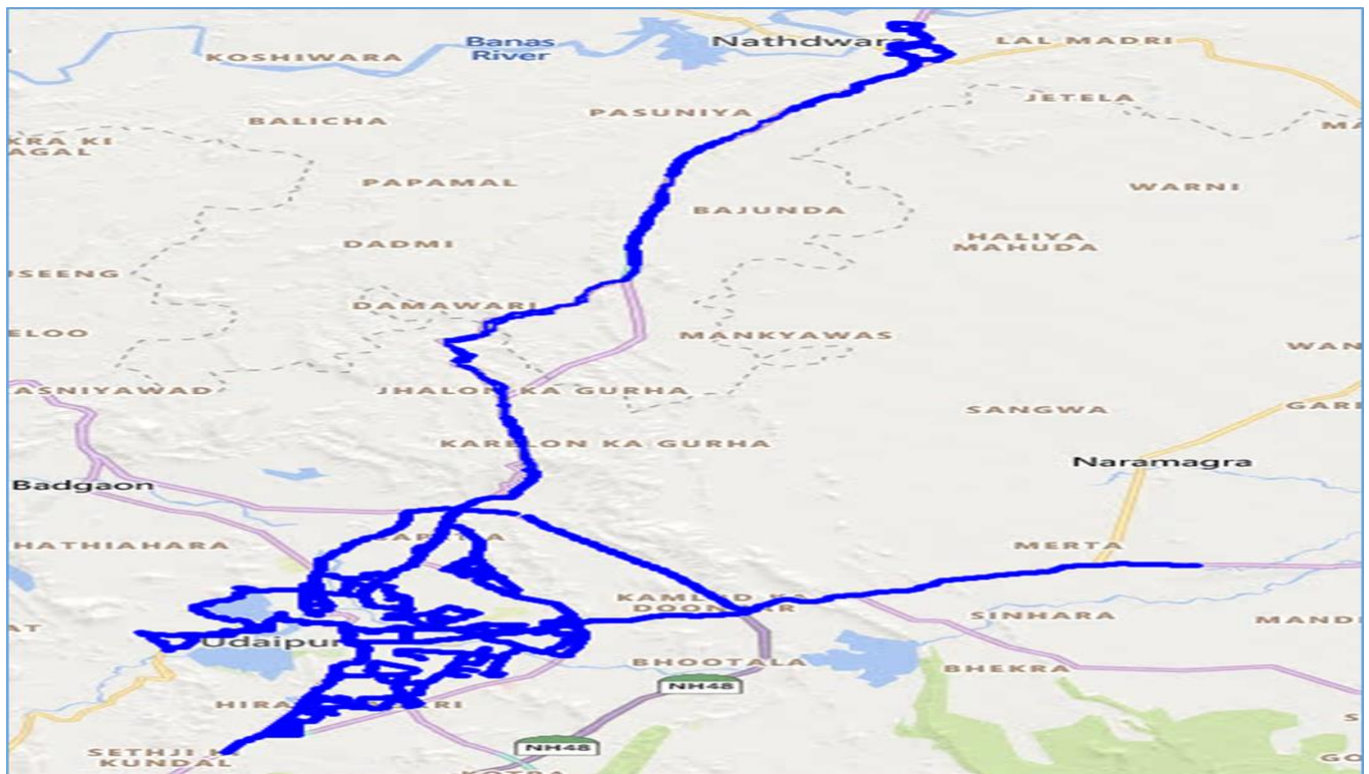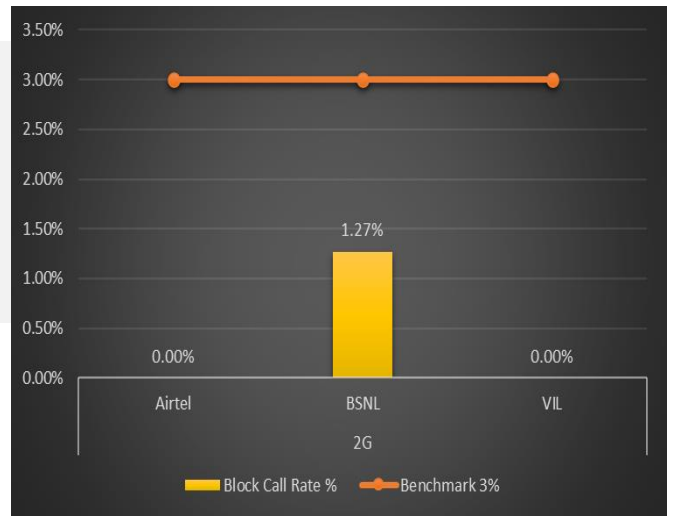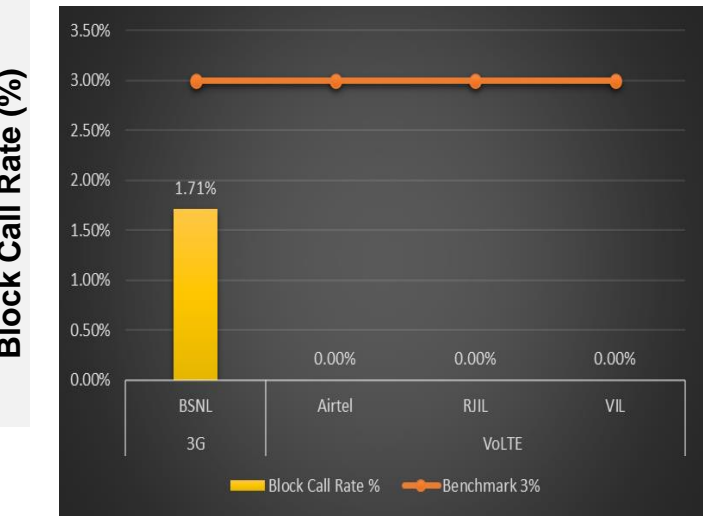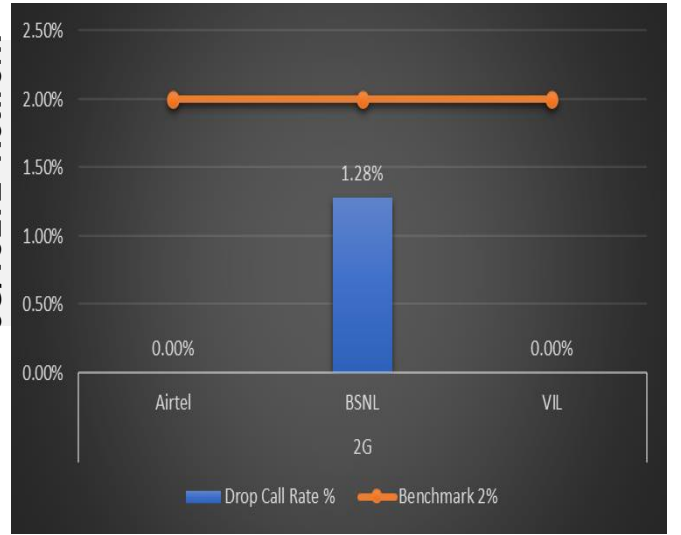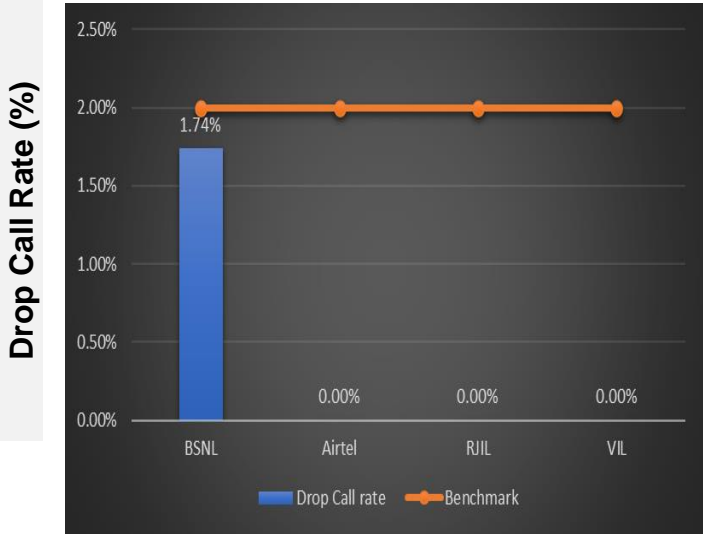

S.No.	Static data Location Name	Area
1	Railway Station, Udaipur	Udaipur
2	Bus Stand ,Udaipur	Udaipur
3	Govt hospital,Udaipur	Udaipur
4	Fateh Sagar lake,Udaipur	Udaipur
5	Airport ,Udaipur	Udaipur
6	Bus Stand ,Nathdwara	Nathdwara

Voice Calls

QoS compliance of the TSPs in Udaipur for Voice across technologies 2G/3G/4G-VoLTE:

KPIs	2G			3G	VoLTE		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0	1.28	0	1.74	0	0	0
Block Call Rate %	0	1.27	0	1.71	0	0	0

a) All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%)

b) Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's.

Voice Calls

Coverage

a) Percentage of coverage samples for 2G ≥ -85 dBm.

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	**95.67**	**91.96**	**88.32**

b) Percentage of coverage samples for 3G ≥ -90 dBm & LTE ≥ -110 dBm.

TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Coverage %	**69.54**	**99.7**	**99.51**	**99.02**

c) Percentage of time spent on 3G/4G network

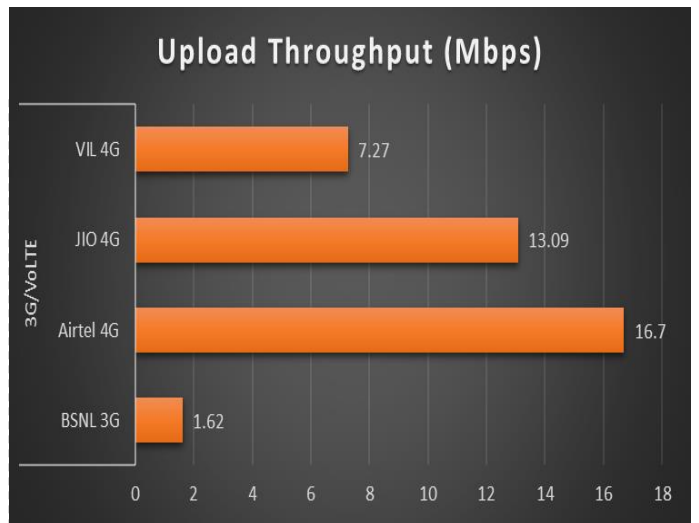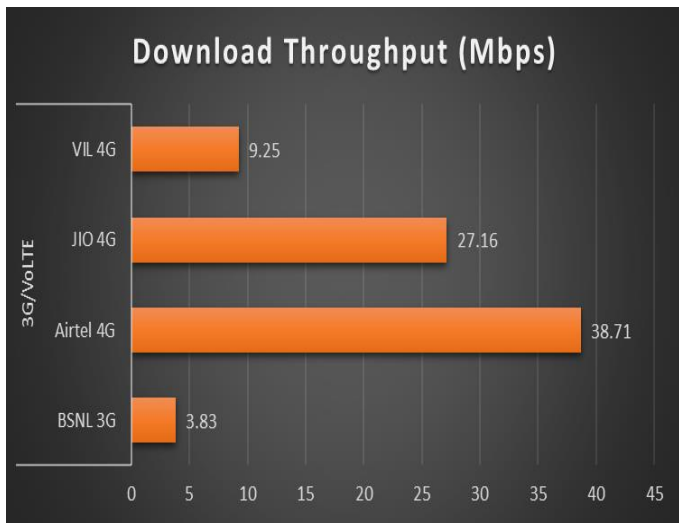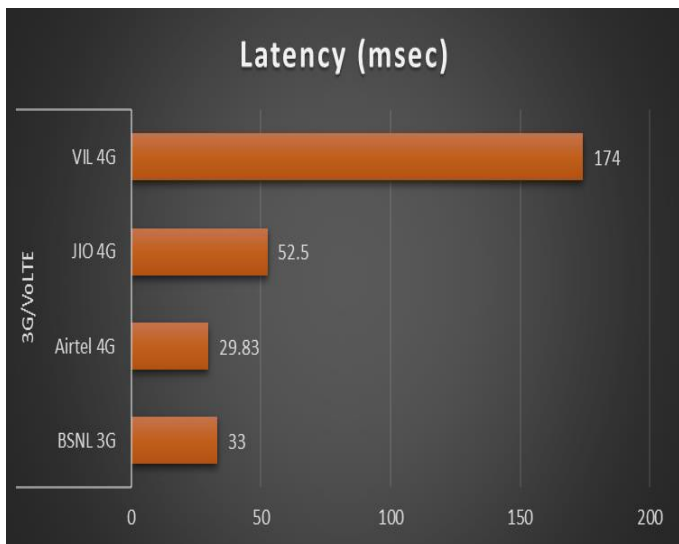| TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Time Spent on 3G/4G %	**17.87**	**100**	**100**	**100**

Data Services Static

Data was tested at 6 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing (Flipkart, Amazon, Paytm)
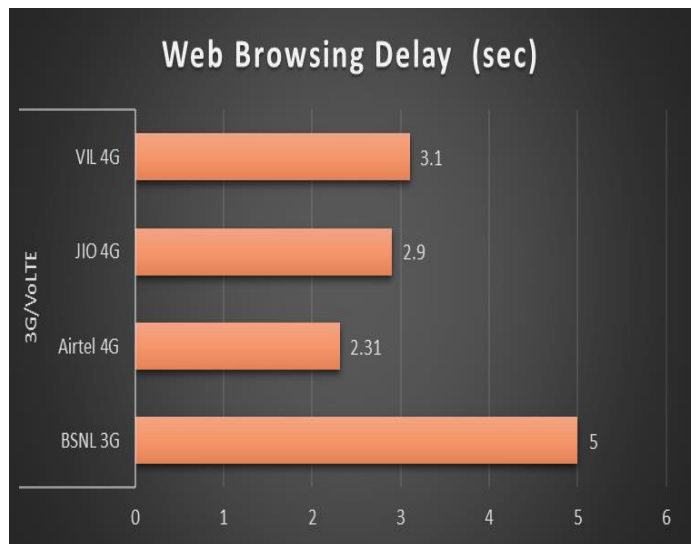
Data Download and Upload Performance Static (Mbps)

3G/4G/ Network:

Download Throughput (Mbps)

3G/VoLTE

Operator	Value
VIL 4G	9.25
JIO 4G	27.16
Airtel 4G	38.71
BSNL 3G	3.83

(x-axis: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45)

Upload Throughput (Mbps)

3G/VoLTE

Operator	Value
VIL 4G	7.27
JIO 4G	13.09
Airtel 4G	16.7
BSNL 3G	1.62

(x-axis: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18)

Latency (ms)

Web Browsing (Sec)

Latency (msec)

3G/VoLTE

Operator	Value
VIL 4G	174
JIO 4G	52.5
Airtel 4G	29.83
BSNL 3G	33

(x-axis: 0, 50, 100, 150, 200)

Web Browsing Delay (sec)

3G/VoLTE

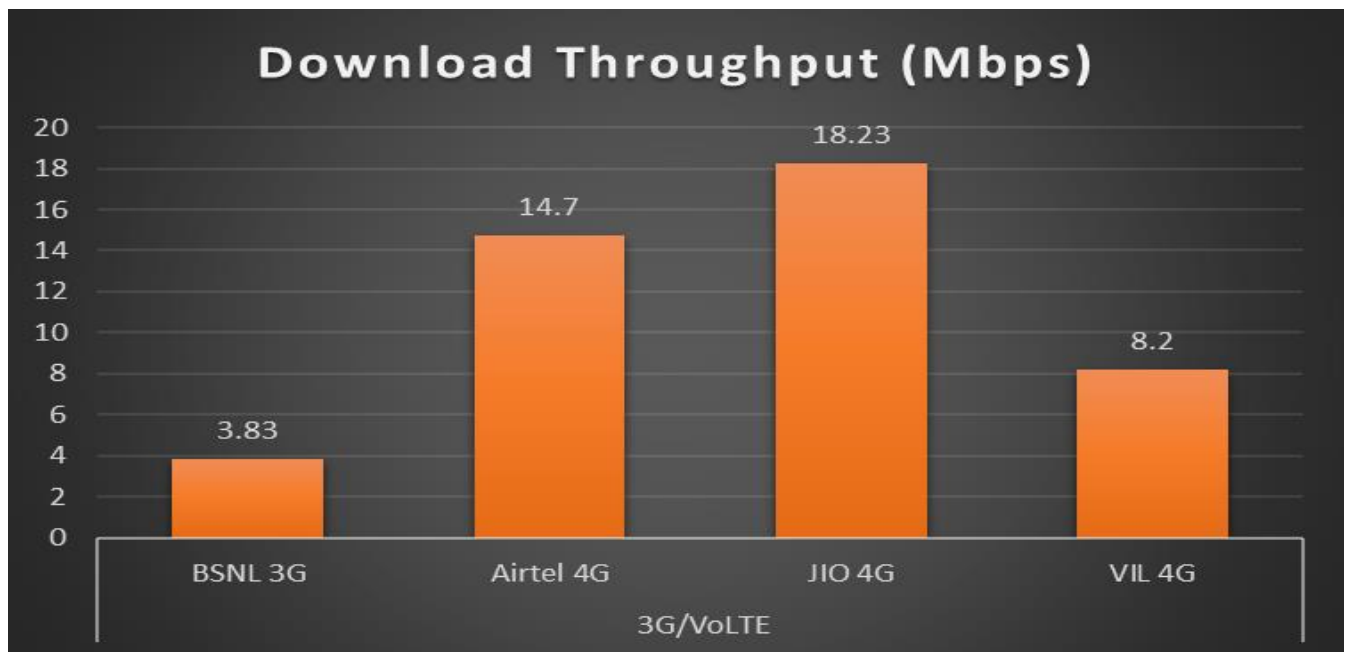| Operator	Value
VIL 4G	3.1
JIO 4G	2.9
Airtel 4G	2.31
BSNL 3G	5

(x-axis: 0, 1, 2, 3, 4, 5, 6)

Data Services Dynamic

Dynamic Data was tested for 50 Kms. Download Throughput was tested.

Data Download Performance (kbps) - Dynamic

3G/4G/ Network:

Data Services Dynamic	3G/VoLTE			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	3.83	14.7	18.23	8.2

Summary

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	286	236	256
Blocked Call Rate (%)	0	1.27	0
CSSR% (Accessibility)	100	98.72	100
Drop Call Rate (%)	0	1.28	0
Mobility HOSR (%)	97.65	96.84	98.25
Rx Quality (%)	96.67	96.35	96.58

Voice Call	3G / VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	233	286	216	262
Blocked Call Rate (%)	1.71	0	0	0
CSSR% (Accessibility)	98.28	100	100	100
Drop Call Rate (%)	1.74	0	0	0
Mobility HOSR (%)	98.21	99.91	99.94	100
Rx Quality (%)	95.65	97.89	93.75	91.04

Summary

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	206.67	185	95.78
Upload Throughput (kbps)	181.67	88	54.34
Web Browsing Delay (sec)	5	55	9
Latency (msec)	201	63	113

Data Services Static	3G/4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	3.83	38.71	27.16	9.25
Upload Throughput (Mbps)	1.62	16.7	13.09	7.27
Video Streaming Delay (sec)	32	0.54	0.57	1.5
Web Browsing Delay (sec)	5	2.31	2.9	3.1
Latency (msec)	33	29.83	52.5	174

Data Services Dynamic	3G/4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	3.83	14.7	18.23	8.2

Udaipur Bus Stand	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	210	220	77.2
Upload Throughput (kbps)	180	190	67.5
Web Browsing Delay (sec)	4.9	143	6
Latency (msec)	208	74	113

Udaipur City Hospital	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	200	211	94.3
Upload Throughput (kbps)	120	132	65.4
Web Browsing Delay (sec)	5.0	66	6
Latency (msec)	242	71	123

Fateh Sagar Lake, Udaipur	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	210	173	101.6
Upload Throughput (kbps)	190	54	76.3
Web Browsing Delay (sec)	5.1	55	7.15
Latency (msec)	261	73	154

Railway Station, Udaipur	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	200	173	93.4
Upload Throughput (kbps)	180	54	70.5
Web Browsing Delay (sec)	4.8	55	8
Latency (msec)	153	73	116

Data Services Static

City Level Summary

Udaipur Airport	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	210	209	99.26
Upload Throughput (kbps)	220	190	95.75
Web Browsing Delay (sec)	5.2	52	6.37
Latency (msec)	188	79	131

Nathdawara	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	210	188	246.2
Upload Throughput (kbps)	200	175	130.2
Web Browsing Delay (sec)	5.3	48	5
Latency (msec)	158	68	135

Udaipur Bus Stand	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	6.54	32.77	16.3	28.61
Upload Throughput (Mbps)	1.52	16.69	16.86	11.62
Video Streaming Delay (sec)	32	0.43	0.63	3
Web Browsing Delay (sec)	25	2.39	2.39	4
Latency (msec)	66	31	31	132

Data Services static

Udaipur City Hospital	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	5.86	25.74	29.86	16.92
Upload Throughput (Mbps)	1.54	10.16	16.51	13
Video Streaming Delay (sec)	32	0.87	0.51	1.6
Web Browsing Delay (sec)	12	2.42	2.75	3.13
Latency (msec)	39	37	54	174

Fateh Sagar Lake, Udaipur	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	9.70	49.00	30.59	10.25
Upload Throughput (Mbps)	1.59	23.96	7.52	5.89
Video Streaming Delay (sec)	29	0.62	0.69	0.82
Web Browsing Delay (sec)	4	2.26	2.73	2.30
Latency (msec)	33	24	50	178.00

Data Services static

Railway Station	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	9.69	47.17	10.4	14.82
Upload Throughput (Mbps)	1.58	27.15	9.49	13.88
Video Streaming Delay (sec)	29	0.37	0.48	1
Web Browsing Delay (sec)	4	2.22	2.87	2
Latency (msec)	33	27	46	119

Udaipur Airport	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	4.31	50.82	29.45	20.63
Upload Throughput (Mbps)	1.64	26.99	8.42	8.08
Video Streaming Delay (sec)	27	0.43	0.59	1.2
Web Browsing Delay (sec)	8	2.39	2.88	2.42
Latency (msec)	39	28	51	142

Data Services static

Nathdawara	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (Mbps)	2.03	26.75	33.03	3.56
Upload Throughput (Mbps)	1.74	7.86	19.72	5.35
Video Streaming Delay (sec)	27	0.42	0.55	2
Web Browsing Delay (sec)	18	2.47	2.84	3
Latency (msec)	48	32	59	68

RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call session. The Coverage rate is calculated on the basis of % of samples in which the Rx level ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	95.67
BSNL 2G	91.96
VIL 2G	88.32
BSNL 3G	69.54
Airtel VoLTE	99.70
Jio VoLTE	99.51
VIL VoLTE	99.02
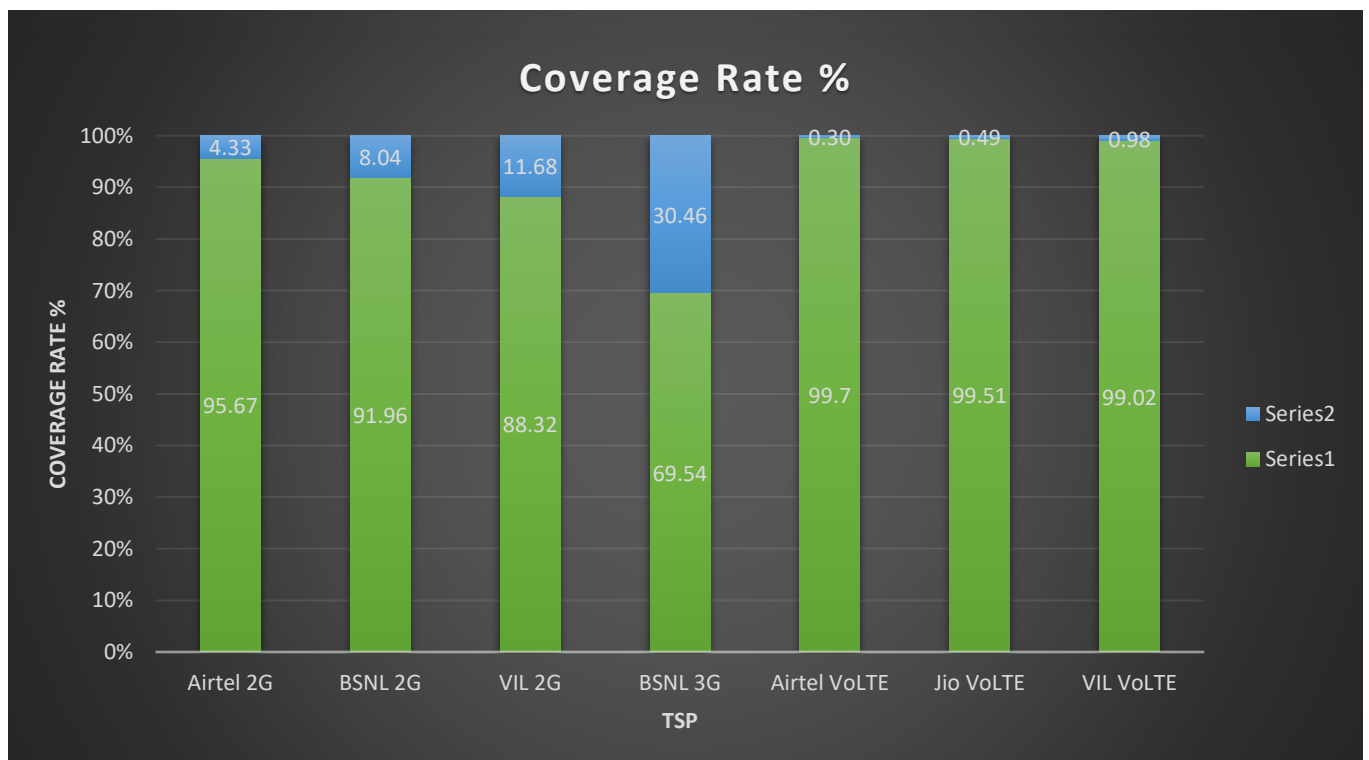
AIRTEL

Technology	Coverage Rate %
2G	95.67
VoLTE	99.70

2G
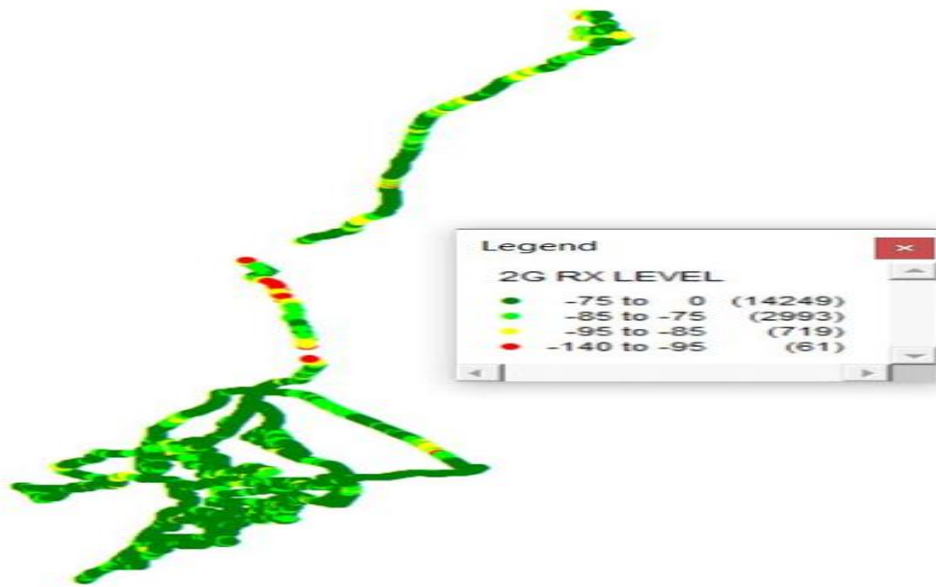
VoLTE
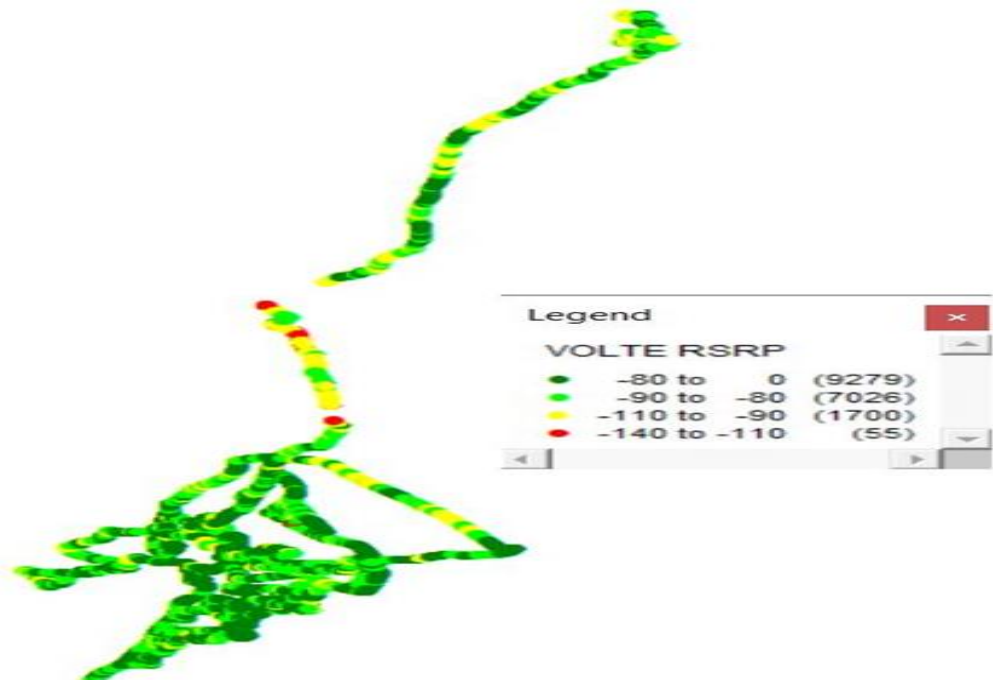
BSNL

Technology	Coverage Rate %
2G	91.96
3G	69.54

2G

3G
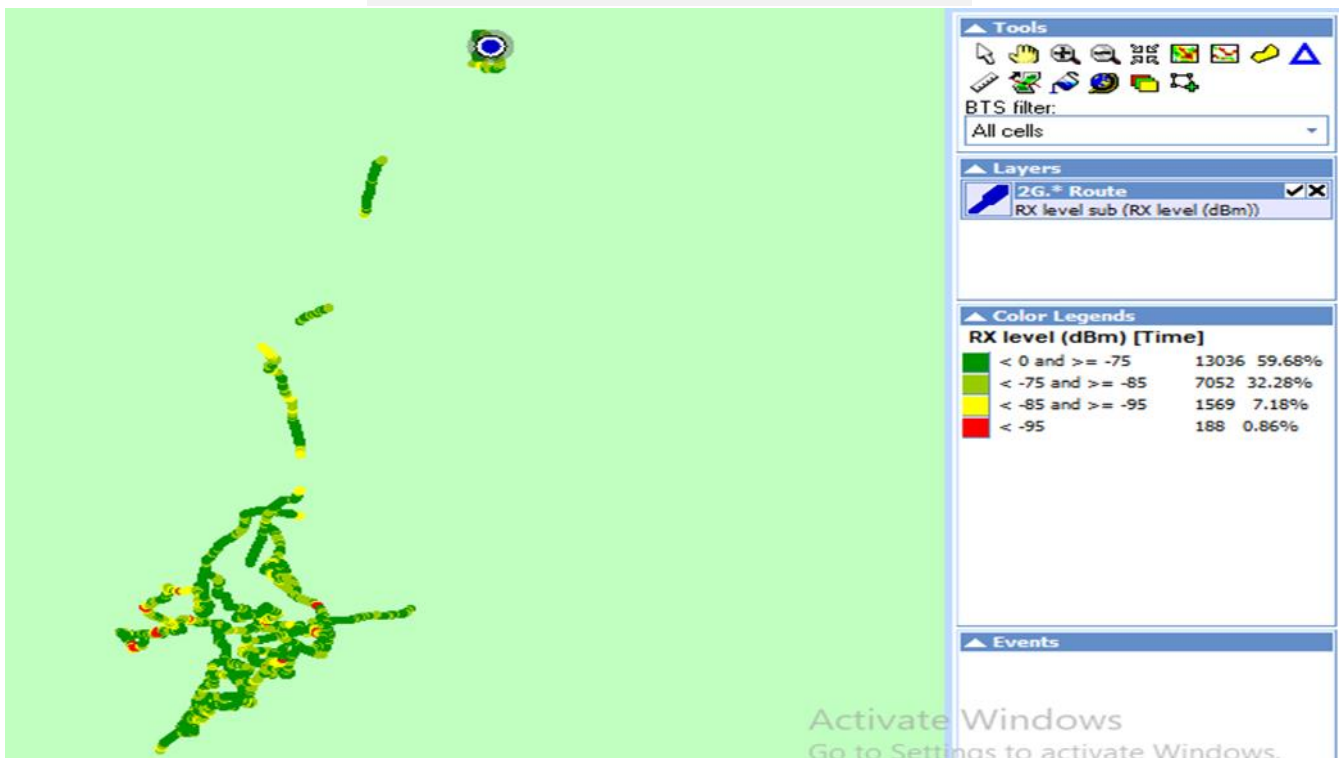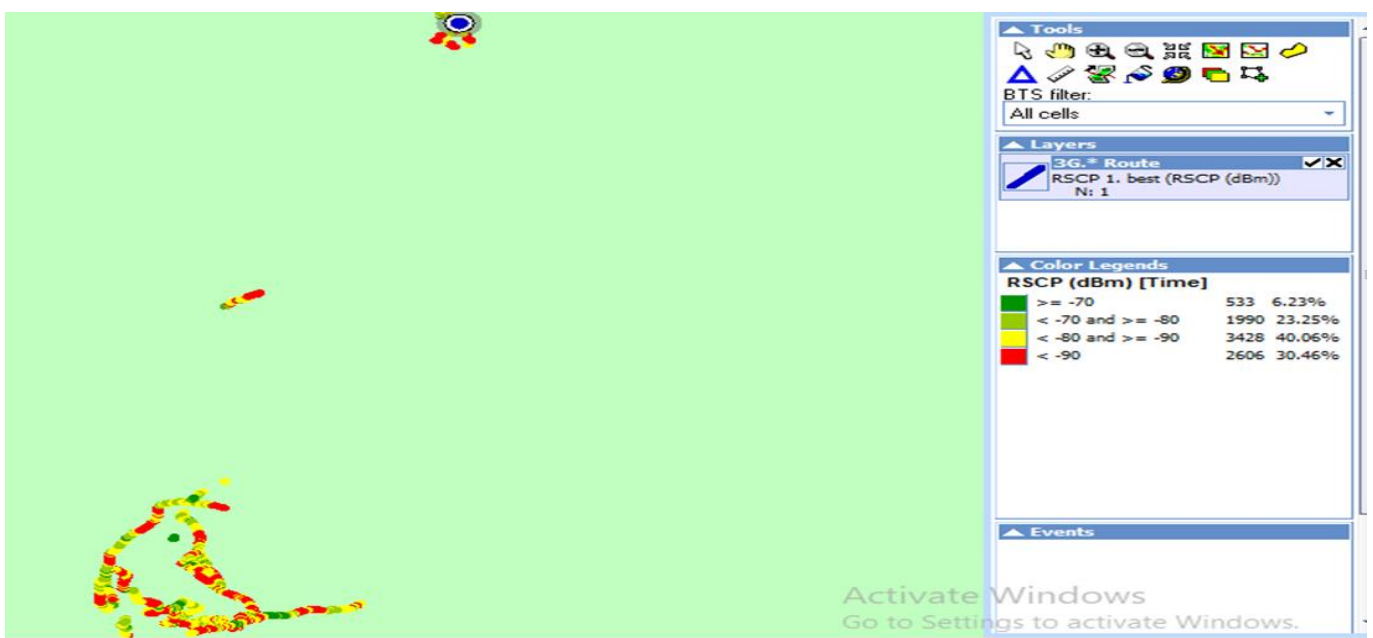
JIO

Technology	Coverage Rate %
VoLTE	99.51

LTE KPI PCell Serving RSRP[dBm]

- -80 <= x < 0 (62.09%, 15221)
- -90 <= x < -80 (25.48%, 6246)
- -110 <= x < -90 (11.94%, 2928)
- -140 <= x < -110 (0.49%, 119)
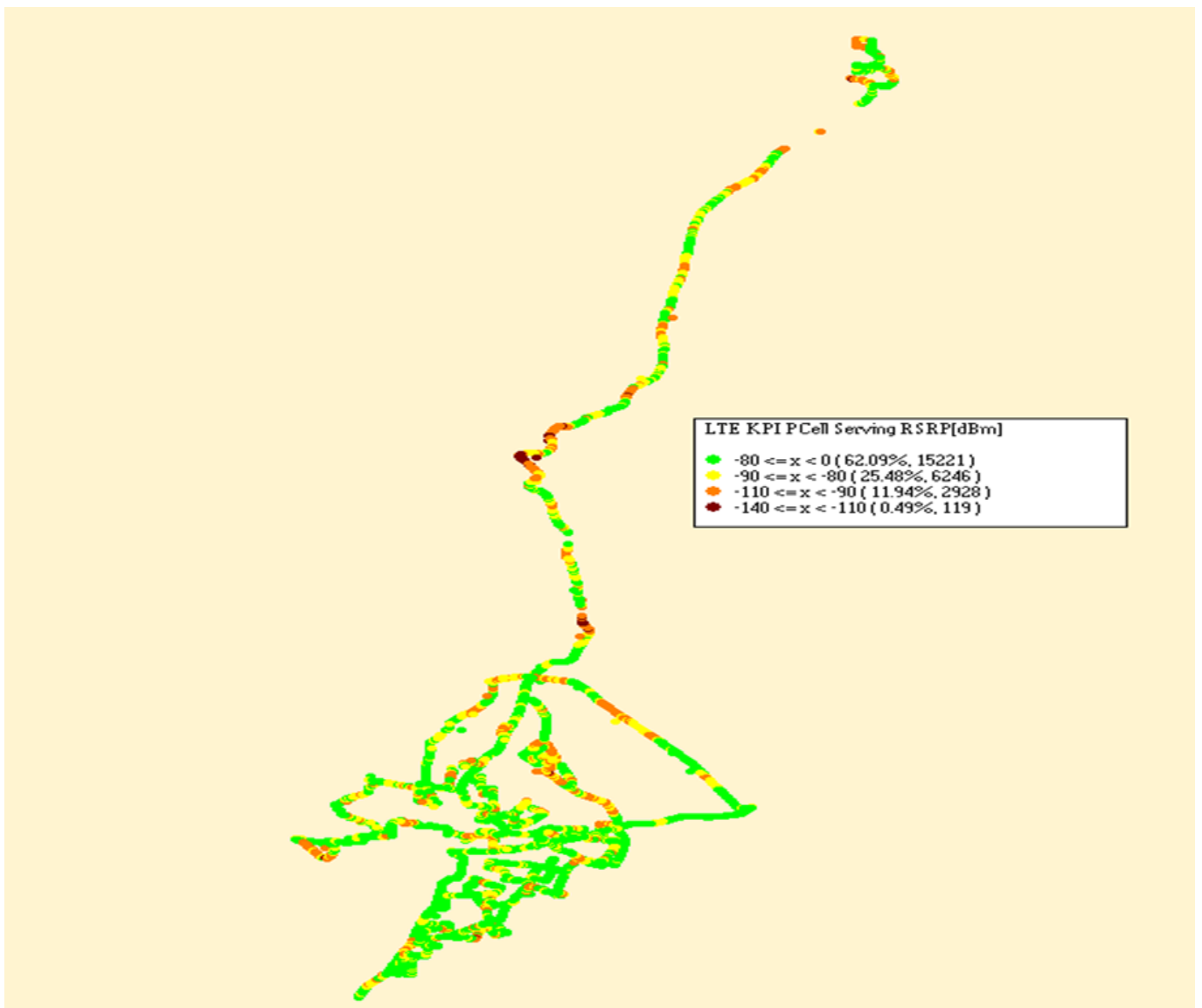
VIL

Technology	Coverage Rate %
2G	88.32
VoLTE	99.02

2G
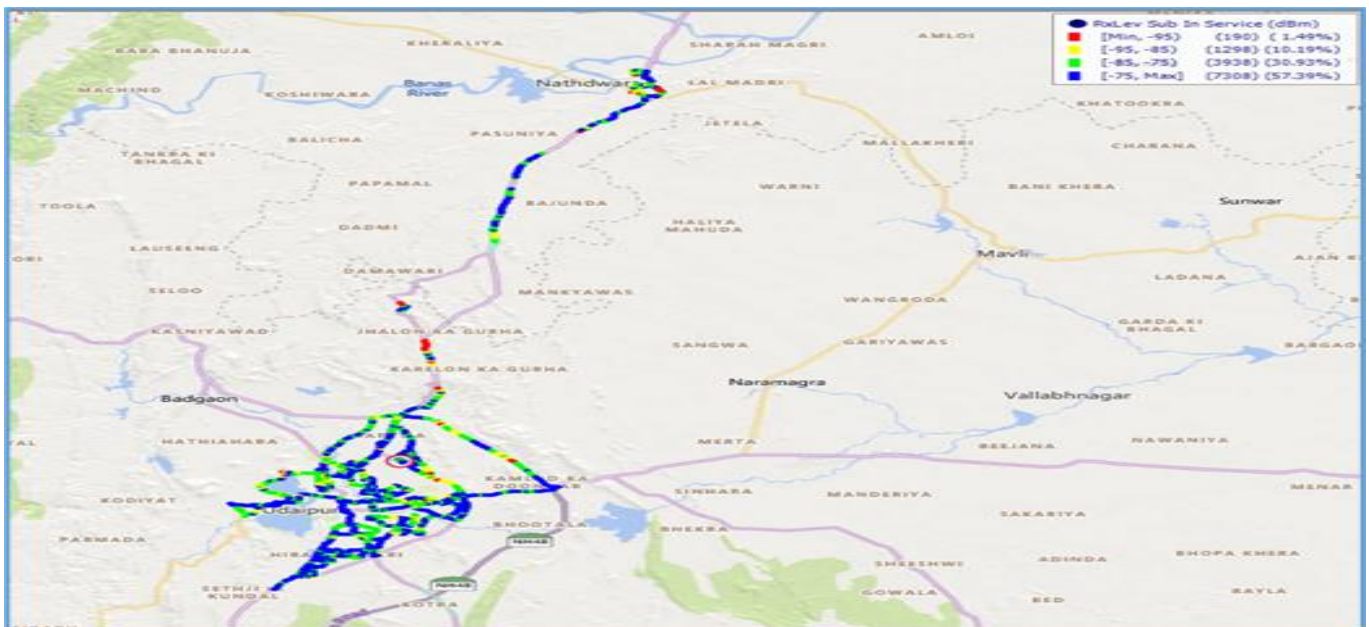
VoLTE
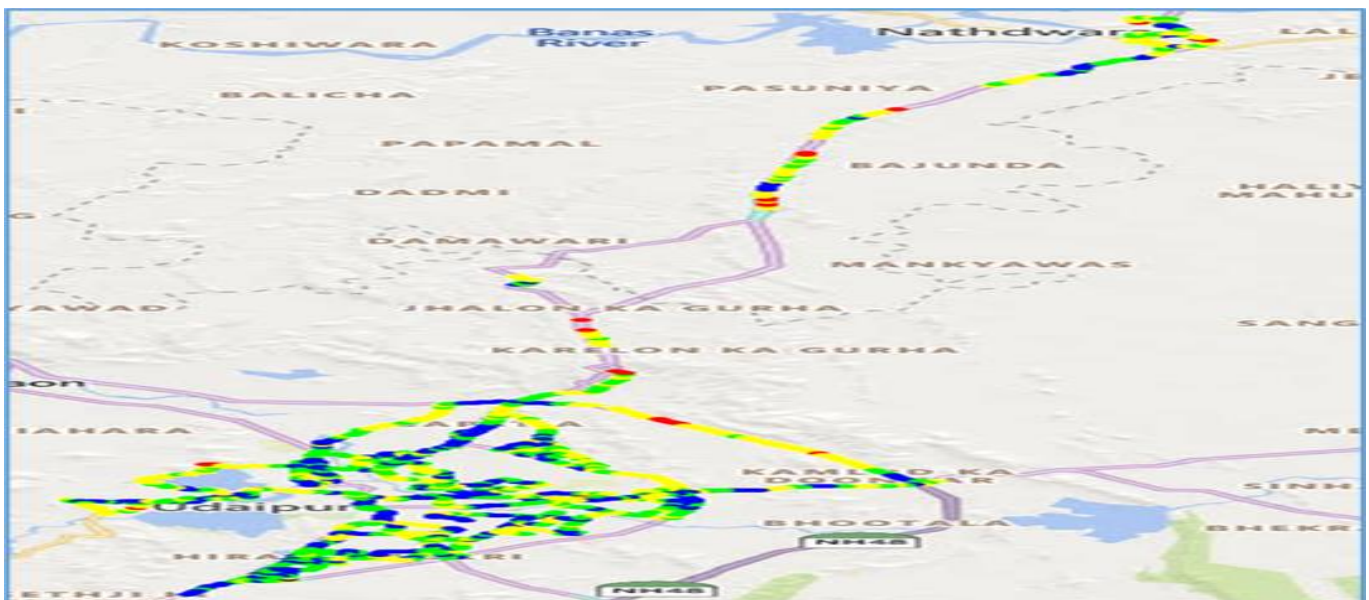
For measuring voice quality, as per the QoS norms, RxQual <=5 for GSM TSPs, EcNo >= -14 dBm for 3G TSP sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

TSP	Rx Quality %
Airtel 2G	96.67
BSNL 2G	96.35
VIL 2G	96.58
BSNL 3G	95.65
Airtel VoLTE	97.89
Jio VoLTE	93.75
VIL VoLTE	91.04
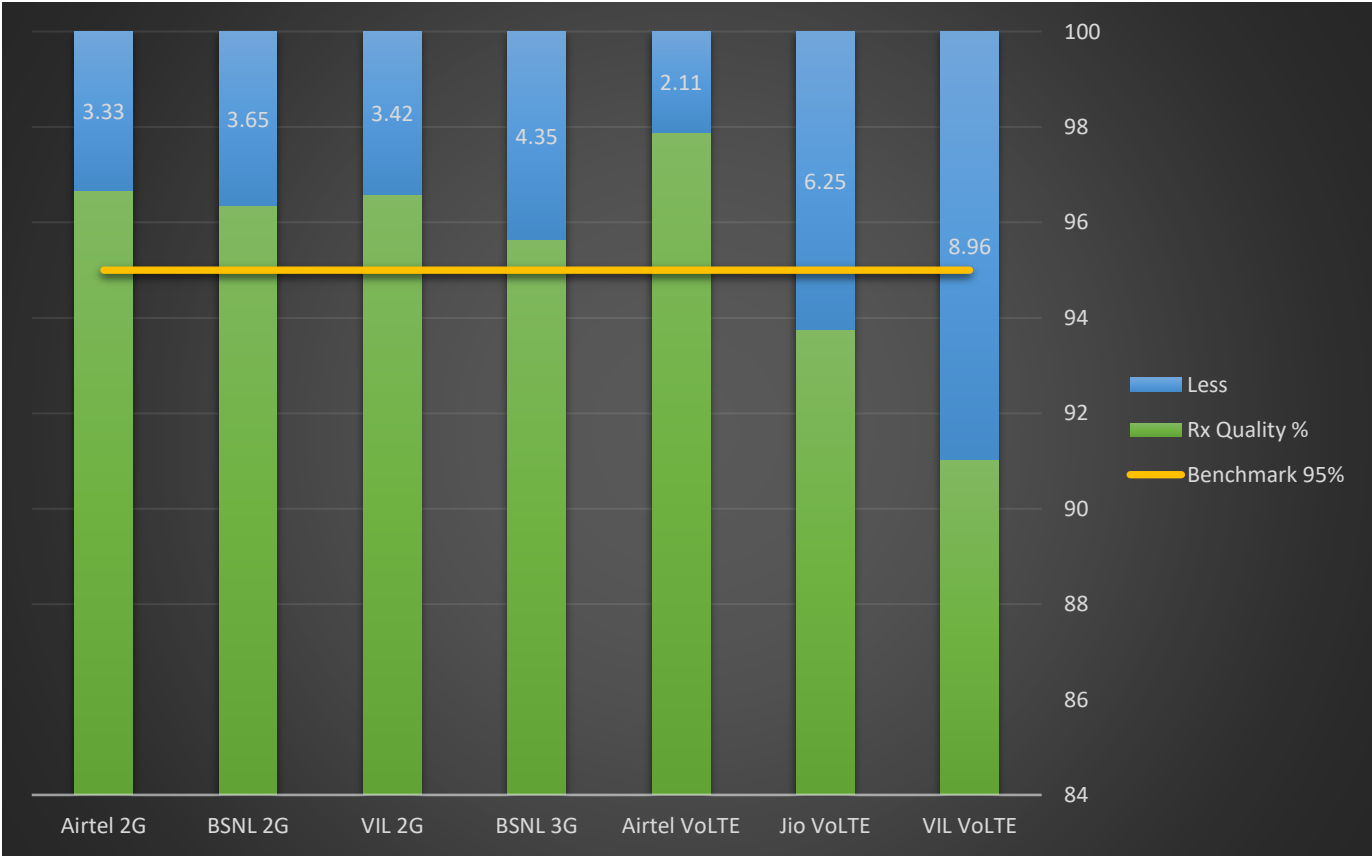
Airtel

Technology	Rx Quality %
2G	96.67
VoLTE	97.89

2G
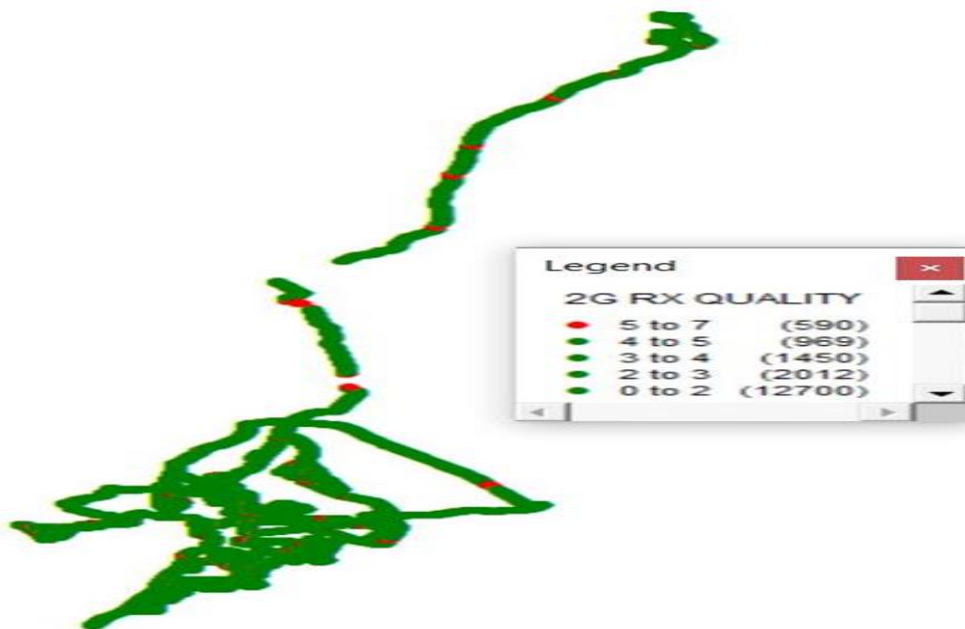
VoLTE
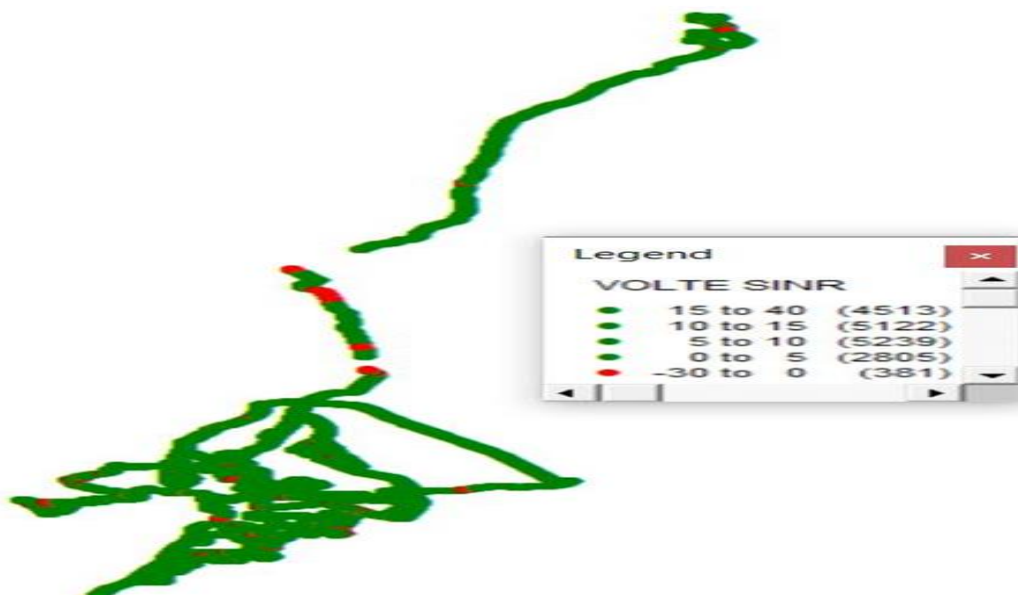
BSNL

Technology	Rx Quality %
2G	96.35
3G	95.65

2G

3G
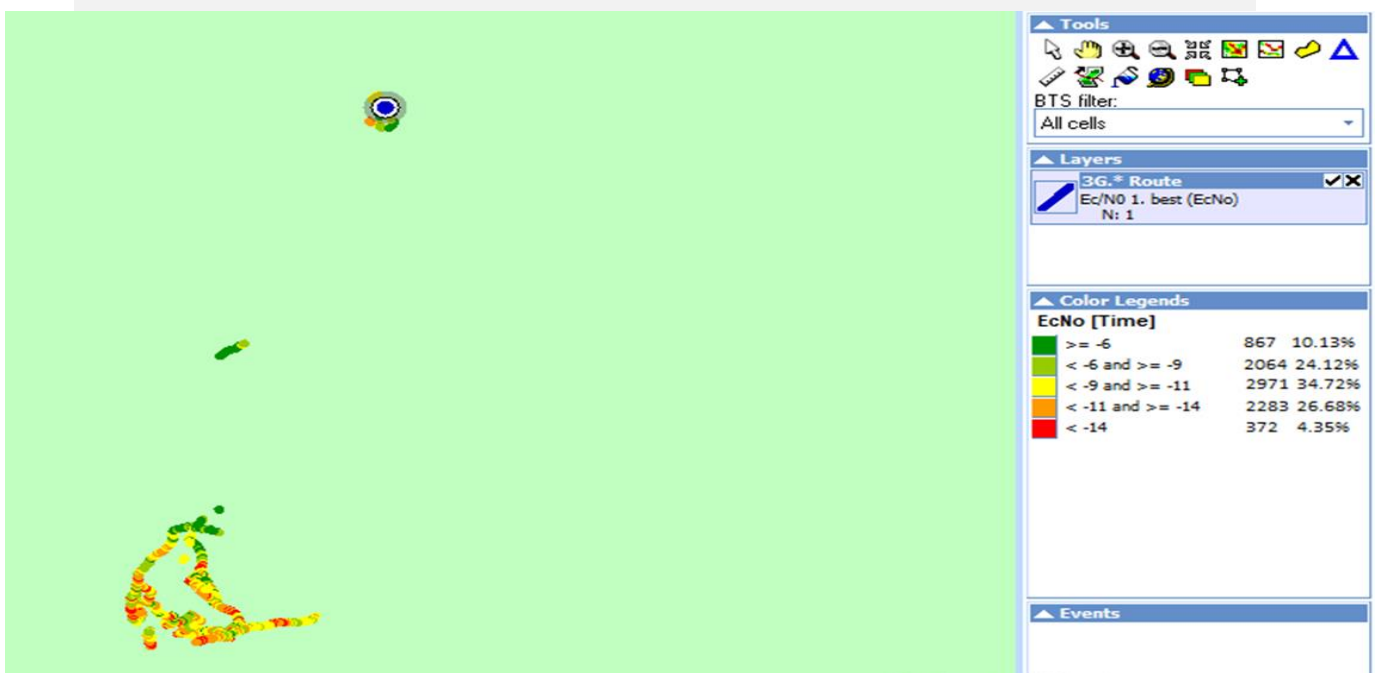
JIO

Technology	Rx Quality %
VoLTE	93.75

LTE KPI PCell SINR[dB]

- 15 <= x < 30 (30.51%, 7478)
- 10 <= x < 15 (23.19%, 5685)
- 5 <= x < 10 (23.47%, 5753)
- 0 <= x < 5 (16.59%, 4066)
- -30 <= x < 0 (6.25%, 1532)
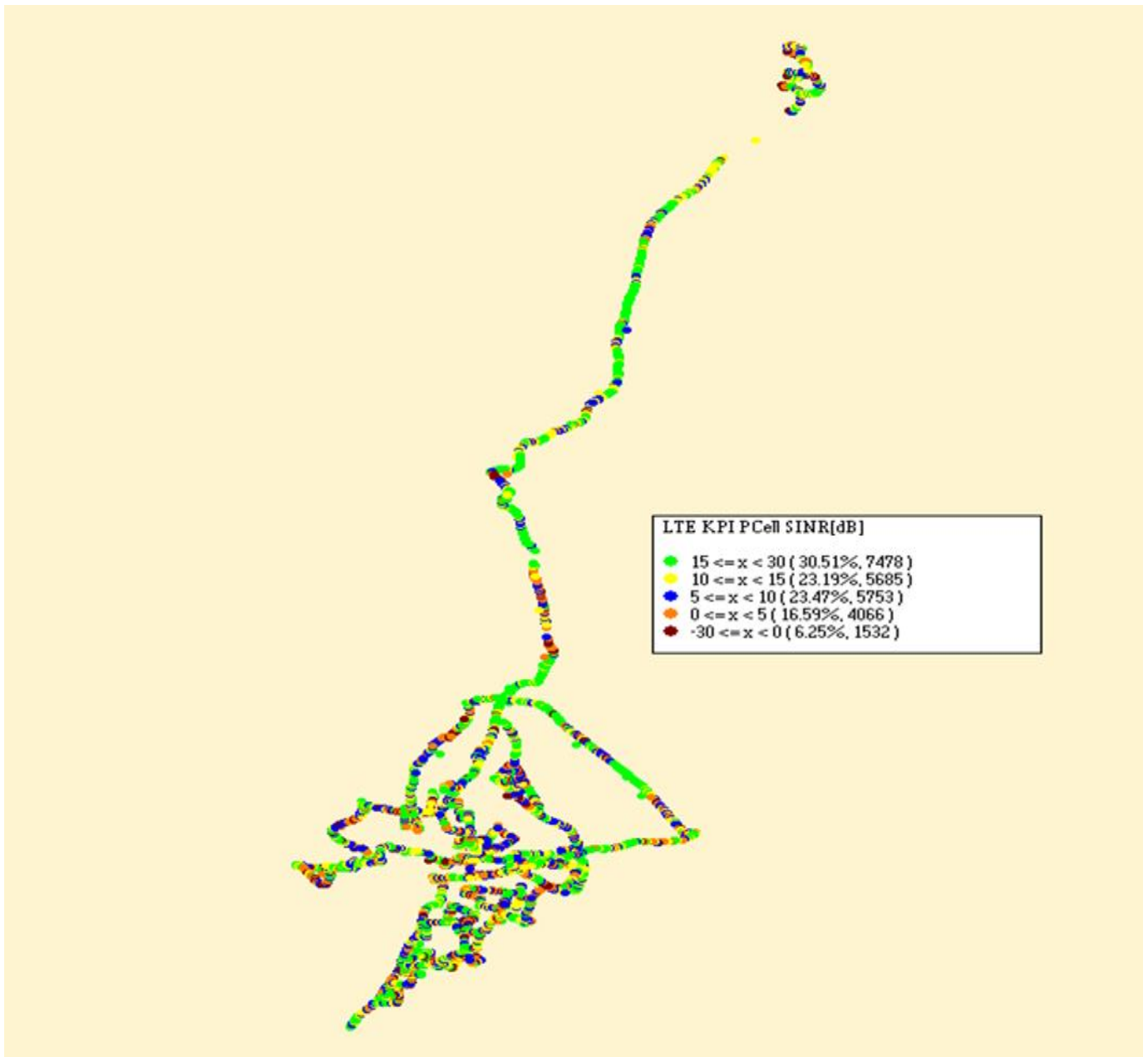
VIL

Technology	Rx Quality %
2G	96.58
4G	91.04

2G
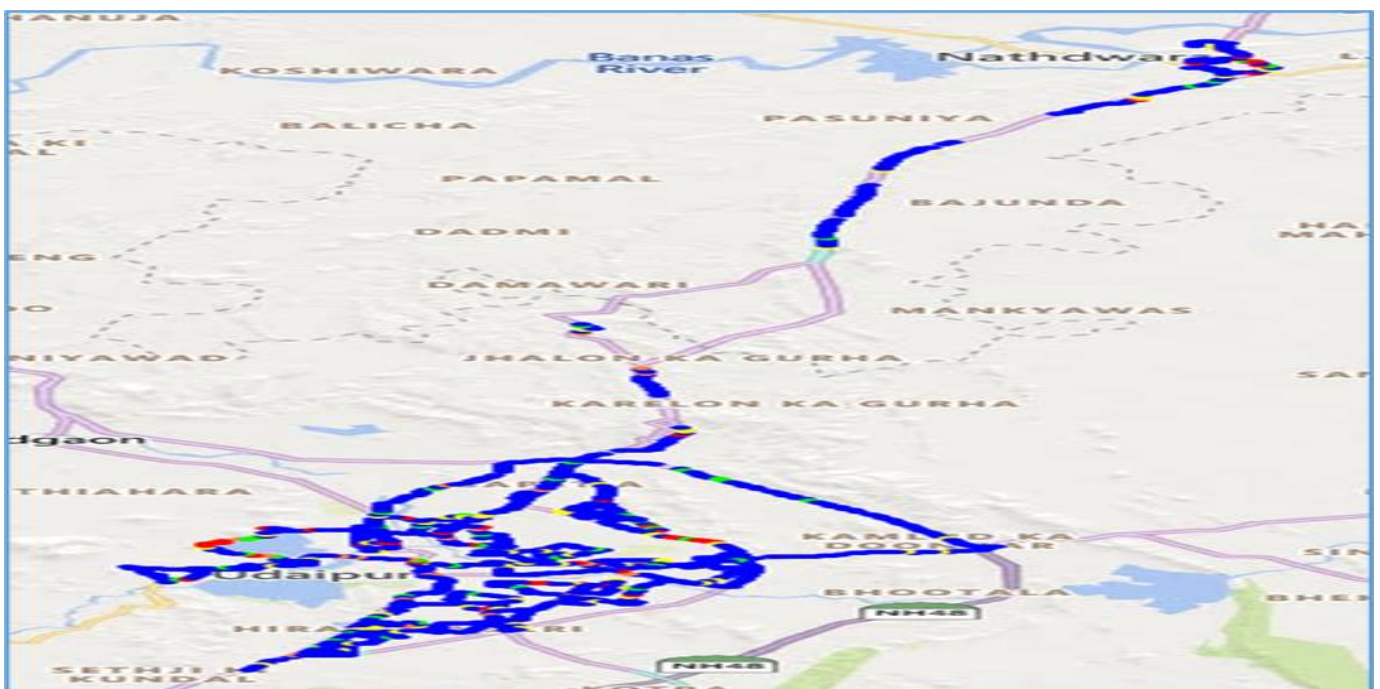
VoLTE
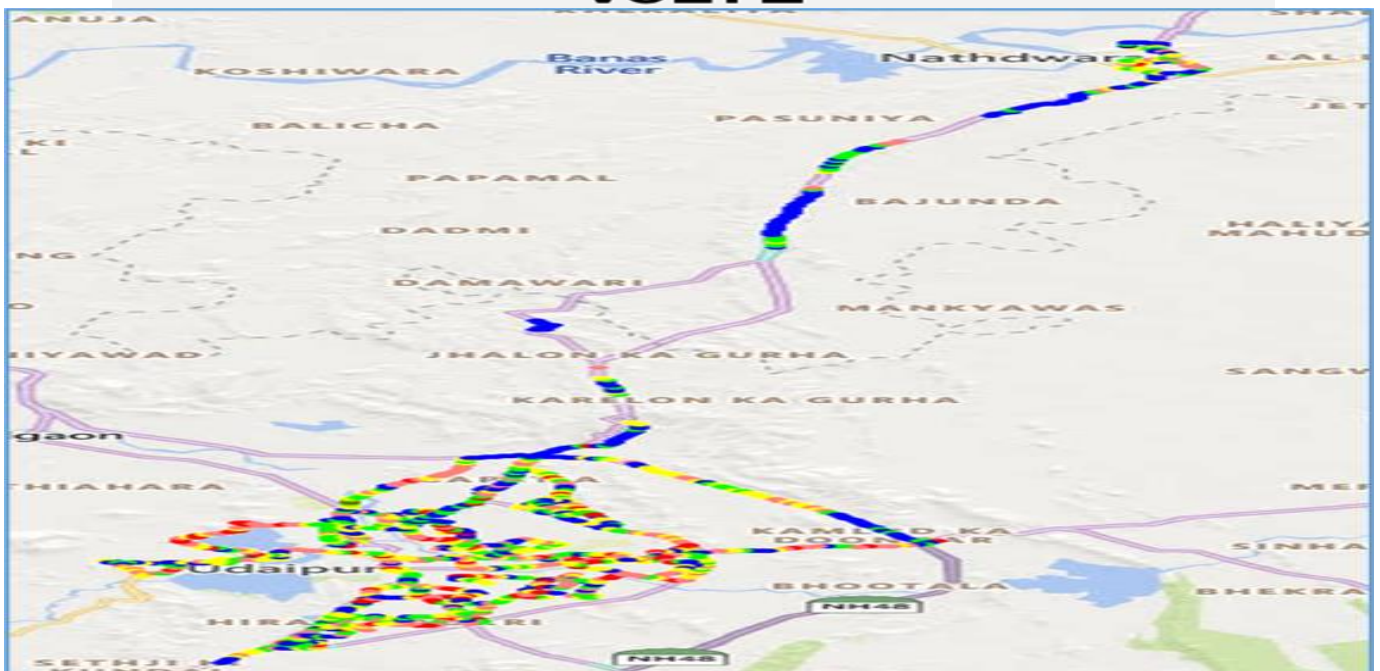
TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	17.87
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	100

Technology Distribution